

# **Environmental Monitoring and Alerting for Computing Room Facilities**

***Wednesday, November 17, 2004  
9:00 am – 10:00 am***

***Gerry Bellendir, Jack MacNerland, David Ritchie,  
and Mark Thomas***

## **Agenda**

***FCC***

***New-Muon -> LCC***

***HDCF -> GCC***

***Futures***

***Vulnerabilities***

***Discussion, Questions, etc.***

# FCC

***Presented by Jack MacNerland***

- Smoke detection
- Sprinklers
- Under Floor Fire Supression
- Tape robot fire suppression
- Power Logic Electrical Panel Monitoring
- Security at FCC

***Presented by Mark Thomas***

- Firus
    - o **New developments**
      1. Installed FIRUS Terminal in OPS Office so can monitor chillers at New Muon ourselves
      2. Set up page to show critical FIRUS info for FCC, New Muon, HDCF, and Casey's Pond.
- Com Center monitors at night; FESS monitors during the day; CD/OPS monitors also.

Device Name	Reading	Units	Type	Location	Minimum	Maximum
<b>FCC</b>						
02.FCC DURESS	Ok	Trbl	EMR	Feynman Computer Ctr		
02.FCC DURESS1	Ok	ALRM	EMR	Feynman Computer Ctr		
02.FCC EMR_DOOR	Ok	ALRM	EMR	Feynman Computer Ctr		
<b>NEW MUON</b>						
06.NUON-CHILL	Ok	ALRM	TRD	New Muon Lab		
06.MU-SUMP-3	Ok	High	UTL	Neutrino Muon Lab NW		
<b>CASEY'S POND</b>						
06.CP-100HP-PSI	82.9	PSIG	UTL	Casey's ICW Pressure	59.99	117.99
06.CP-400HP-GPM	2827.8	GPM	UTL	Casey's 400 Hp GPM	81.16	5078.3
06.CP-100HP-GPM	1203.1	GPM	UTL	Casey's 100 Hp GPM	-2000	7250
<b>HDCF</b>						
05.WBL-HALL-LOT	Ok	LoTn	UTL	Proton Wide Band Lab	59.95	99.96
05.WBL-N-CR-LOT	76	LoTn	UTL	Proton Wide Band Lab		
05.WBL-SUMP-2	Ok	High	UTL	Proton Wide Band Lab		

**FCC, LCC, GCC FIRUS Page**



**FIRUS Timeplot**

- **UPS and Generator Monitoring and Alerting via Metasys**

***Presented by David Ritchie***

- **Metasys – current and future (see Appendix A)**
- **Other**
  - CDF (Glenn Cooper): The CDF nodes just have straight lm\_sensors, using the RPM put together by the Farms group.
  - CSS (Stan Naymola): We have two types of monitoring in place.
    1. One is the lm\_sensors. It can shutdown systems that are hot. It is self-contained and works independently of any other system. If more than 50% of the nodes are down it will notify us. The single nodes that turn themselves off are recorded in logs for later investigation.
    2. The second monitor is an independent temperature monitor located in the top of a rack. This is recorded on our ganglia monitor as a record of the room temperature. It emails us when it crosses highs and lows. But it does not page us.

# **~~New Muon~~ -> LCC**

## ***Presented by Jack MacNerland***

- **Smoke detection**
- **Sprinklers**
- **Under Floor Fire Suppression**
- **Security (Pegasys)**

## ***Presented by Mark Thomas***

- **Firus (Chillers plus usual fire protection system)**

## ***Presented by David Ritchie***

- **Metasys – See Appendix A.**
- **Other**
  - See discussion under FCC above for CDF information.
  - Lattice QCD (Don Holmgren) — has relied for a couple of years on our "Omega" temperature box at New Muon.
    - This box can alarm on high/low temperature, and/or any other dry contact input. Its only method of notification is to dial out on a phone line, using a 4-number rotation until acknowledged.
    - Currently, the Omega box phones the call center, then Amitoj's office number, then my office number.
    - Before the call center was available, we realized that the loss of operators would leave us vulnerable when the Omega box couldn't reach anyone by phone. So, we purchased the Netbotz unit, which connects to the network and has the ability to send e-mails, push files via FTP, and serve data via HTTP. It also has a "last call" paging unit which can dial out when there is a power loss.
    - We have not switched to the Netbotz for notifying the call center; we still use the Omega box for this. We do have the Netbotz unit configured to send e-mail to lqcd principals on various alarms. We also gather data from the Netbotz for trend plots. See, for example,  
  
<http://lqcd.fnal.gov/cgi-bin/netbotz>
  - A live web page is also available: <http://netbotz.fnal.gov/>
- Lattice QCD (Don Holmgren) — IPMI
  - We use IPMI to readout cpu and system temperatures, as well as fans.

- IPMI includes vendor-specified thresholds. When a sufficient number of nodes are over temperature, we automatically declare an alarm and shutdown our batch queues, then the operating systems, and then we power off the nodes via IPMI. Independently, the Netbotz and Omega boxes can trigger an alarm which causes the LQCD and/or ISA groups to manually initiate shutdowns if necessary.
- We maintain trend plots for all measured quantities, and have automated mailings listing nodes with bad fans and/or high temperatures. The trend plots are available by clicking on the vertical bars on

<http://lqcd.fnal.gov/cgi-bin/stat?health=all>

or via individual nodes,

<http://lqcd.fnal.gov/cgi-bin/stat?health=qcd0102>

<http://lqcd.fnal.gov/cgi-bin/stat?health=MRTG=qcd0102>

# **~~HDCF~~ -> GCC**

## ***Presented by Jack MacNerland***

- **Smoke detection**
- **Sprinklers**
- **Under Floor Fire Suppression**
- **Security at GCC (Pegasys)**

## ***Presented by Mark Thomas***

- **Firus**
- **UPS Monitoring and Alerting via Metasys**
  - o Connection under development – See Appendix A.

## ***Presented by David Ritchie***

- **Other**
  - o Planned to have LMSensors, etc. (see above)
  - o Planned to have auto-shutdown developments via Liebert. On-going discussions with Zonatherm and Liebert indicate that Liebert has an automatic shutdown capability that may be acceptable as a mechanism for shutting down the PCs in GCC upon the UPS signaling that it has gone to batteries. This involves:
    - An “agent PC” running Liebert-provided software which senses via the dry contacts of the UPS the UPS status.
    - Software (running SNMP) notifying on an IP-by-IP address basis each GCC PC that it should shutdown.

The cost appears to be approximately \$5,000. There are a number of outstanding issues—in particular, the Liebert software seems to expect to be hand-installed for all ~1400 PCs and it also expects to have the 1400 IP addresses manually entered. Liebert appears to be interested in correcting these matters.

## **Futures**

- Facilities Environmental Event Notification Scheme
- Next Generation Metasys

## **Vulnerabilities**

- FCC has loss of Casey's Pond Water or anything in that causality chain as its main vulnerability (JM)
- New Muon has loss of electrical and/or loss of water as its primary vulnerability (age?, ownership?) (JM/DR)
- HDCF has loss of cooling without consequent loss of power as its main vulnerability (JM/DR)

## **Discussion, Questions, etc.**



# Appendix A

## *Metasys – Current and Future*

This information has been compiled by David Ritchie.

### **Current**

FESS (Mike Michalak) – Status as of 11/12:

FCC is operational. (I believe there is work to be done connecting the Power Logic panel monitoring to Metasys, however-DR).

For HDCF, the network is in the same room as the Metasys Panel (this per Mike via others in CD, I believe).

Mike said that he believes he should have that up on the Metasys System Extended Architecture (Next Generation) next week (week of 11/15?); however, they will be a wait required for a power outage to tie in the power meters.

For New Muon, currently there is no Metasys.

Ted Thorson reports that they have purchased an NAE for New Muon and are ready to talk about what you want on it at that facility. Ted further states that a network connection for Metasys is required at New Muon.

Mike reports further that the Metasys System Extended Architecture (MSEA) will be installed with the new CRAC units as part of the New Muon project which started on 11/15. At that time, we will also begin to monitor chilled water temperature, chiller status, and pump status on MSEA.

### **Future**

FESS (Ted Thorson) – Technology: Status is:

- The New Metasys system is ready for deployment, but is awaiting the approval of the Critical System Plan, which is required before we can buy the PIX firewall and VPN concentrator.
- All of the existing equipment is on Ethernet and all of the existing equipment has been migrated to the new system. No one will be able to see the NAE at HDCF or New Muon until we are allowed to deploy the system.

FESS (Roger Slisz) – Critical System Coordinator: To do list is:

- Procuring a VPN concentrator and a PIX firewall device (may be one piece of hardware).
- Securing VPN accounts for initial round of named users
- Completion of third draft of the CSP
- Training initial round of named users on how MESA works and what they can and can not do with it.

(Note: This has been a long complex project begun in February 2001 and now perhaps close to first deployment.-DR)